

Malibu Creek Watershed Results of O/E and MMI Discussion
Meeting Notes
April 19, 2013

Participants

SCCWRP: Ken Schiff; Raphael Mazor, Andy Rehn, Eric Stein
EPA: Cindy Lin
Tetra Tech: Amy King, Jon Butcher, Mike Paul, Ann Lincoln

Objective

- Evaluate results of EPA/TT beta testing the revised Bio-Objectives' Reference models
- Review the results of the O/E and MMI
- Evaluate the assessment of the condition in Malibu Creek Watershed

Discussion Points

A. Malibu Creek Watershed Beta-Testing of the CSCI Reference Model

1. Was the beta-testing of the models successful?
2. Result of using the 5% and 10% thresholds at this point
3. How does this beta-testing effort assist with the overall Bio-Objective development efforts?
4. What is the schedule for providing documentation?
5. It appears none of the reference sites are in the Malibu watershed? Confirm?
6. Does O/E take into consideration of the geologic formulation (e.g., conductivity predictor variable)? Does MMI? Specifically, how does inclusion of the Geologic Data (PCT_SEDIM, CaO_Mean, MgO_mean, N_MEAN, P_MEAN, S_Mean) consider Monterey Formation?
7. Review the reference data set to get better understanding of its use in specific watersheds

Notes

- Ann described the beta testing process and QA conducted (slide 3). Overall there was good agreement; differences were likely due to differences in GIS digitization and processing, which is accepted. Differences were found in the following variables: area, elevation, precipitation, S_Mean, N_MEAN, and percent sedimentary. Rafael did not feel that differences in the three geological variables would result in too much difference in the results; however, the area, elevation, and precipitation differences are likely more important.
- Sensitivity testing on the variables has not been planned, but may be useful. Raphael indicated that testing can be done on the variables that are likely more sensitive.
- Some samples showed disagreement between the flagged values on the percent of ambiguous individuals. Slide 25 showed that more recent data had greater number of samples flagged as inadequate (due to the difference between 600 and 900 count samples changed over time).
- Mike asked whether the midge resolution is causing most of these differences and Ann indicated that the midge resolution is part of the problem, but not the entire problem. Data sources for Malibu varied widely (LA County, EPA, HtB, Regional Board, LVMWD, etc.) and most of the data were to Safit Level 2, but not all.
- Slide 26 shows the O/E data and indicates that the highest percent inadequate samples are in tributaries. Andy indicated that we would have to get into the raw data more to figure this out.
- Raphael is helping to determine why Ann's hand calculation of percent ambiguous differs from those automatically calculated. This is ongoing and no new information is available to report.

- Ann inquired about how the percent ambiguous issue impacts the calculation of the O/E. Raphael indicated that if they are unbiased across taxa then there is little to no impact. Mike asked about the situation when you have a dataset where the ambiguous data are potentially left out before one starts to build the model (i.e., can you prospectively figure out an O/E as opposed to the normal method of applying existing datasets to calculate a retrospective O/E). It was agreed that the more important issue is ensuring the taxa are adequately identified during sample analysis. Raphael indicated that a site specific analysis may be helpful.
- Cindy summarized that we were overly conservative in the approach and that it is not likely affecting the overall results.
- Ken suggested that the data be evaluated on count requirements to see how much was left out because it does not meet the target. Ann indicated that she can look into that.
- Raphael indicated that he would be concerned if the only samples that were impaired were also flagged as a high level of ambiguity. Ken suggested calculating the results with and without the flagged results as a sensitivity run.
- Andy indicated that for a MMI, ambiguity is calculated on a sample by sample basis, while for O/E it is calculated for the overall dataset. So the use of thresholds
- Ann indicated only 7 samples (~~293~~%) were flagged as inadequate for the MMI based on count (only one sample had less than 100 individuals). The taxonomic resolution issue was more important for determining ambiguity. Ann indicated that 26% of samples were flagged as inadequate for taxonomic resolution.
- Ken indicated that a user's manual will be developed initially, eventually followed by an online calculator. An online calculator will eliminate some of the differences from GIS.
- Cindy asked about the reference dataset. The reference dataset is based on sites throughout California; however, no sites are in the Malibu watershed.
- Some Malibu data were used as stress sites for calculation of the MMI (two sites were in Malibu). Stress was defined by watershed development and not biology.
- Cindy asked how applicable the reference dataset was to Malibu. Raphael indicated that there is no specific reason to doubt the index and based on data at minimally-developed sites, it looks like reference type-conditions are attainable in the Malibu watershed. On Slides 6 and 7, Cold Creek is a potential reference site. MMI looks good at this site, while O/E does not show reference conditions in more recent years.
- Raphael indicated that conductivity is not a predictor in any of the models, but is a factor when selecting reference sites. Geology (including Monterey formation) mostly impacts the MMI and not the O/E continuous model. O/E is based on 5 predictors (temperature, precipitation, elevation, area, and latitude) and MMI is based on 8 different models (most of which have more predictors including geologic variables). This may help explain the difference in some of the results in Malibu.
- Cindy asked about the decision process for the thresholds and the status of that effort. Ken indicated that a lot of time has been spent on identifying and evaluating thresholds. The Scientific Advisory Panel liked the population-based thresholds and ones with ecological meaning – ultimately declining to comment on actual numbers. These numbers were also shared with stakeholders. They lacked consensus on a decision on numbers, but everyone agreed on the use of multiple thresholds. This is currently being interpreted as using at least two values. This will likely be a population-based estimator (probability-based or percentile), but exact values are still unknown.
- Mike asked about previous thresholds used and Andy indicated that they previously used 2 standard deviations from the mean as a general cutoff. Mike mentioned that this is similar to the Threshold05 (in a one-tailed test, 1.65 SD is equal to 5%).

Commented [ARL1]: 3% of samples flagged as inadequate based on count; 26% of samples flagged as inadequate based on ambiguous taxonomic identification.

B. O/E and MMI Results for Malibu Creek Watershed

1. Were results different with the O/E versus MMI versus SC-IBI?
2. Did our overall conclusion change? For the Mainstem? For the Tributaries?
3. Are there similar correlations with the impervious cover? Nutrients? Phab?
4. Do the new calculations of O/E and MMI, and the combined index tell us something different (or same) now versus with just the SC-IBI?

Notes

- There is not a strong relationship between MMI and O/E (see Slide 9). Ken indicated that this is consistent with what they expected (and Mike also mentioned that this has also been seen in Maryland).
- Boxplot analysis showed that the SC-IBI (Slide 12) results have similar patterns to the MMI (Slide 13) (LV9 had 10 samples and 5 were ambiguous based on taxonomic resolution). Values were lower within the Monterey Formation. For O/E (Slide 14) the mainstem stations are similar to the reference sites (within and outside of the Malibu Formation). Raphael inquired about what the "E" was for these sites and thought it would be low. For Cheseboro, Ann indicated that E = 6.8-7.7 and will look into why they are different, as they should be the same (three different E's were available for LV ranging from 7.6-8.3). Andy indicated that it is generally known that O/E does not work well when the E is less than 10 (Raphael said that they began to see problems with E's below 13). Ann indicated that E in Malibu range from 6.7 to 11. Ken indicated that this is why the combined metric is important.
- Mike asked whether there have been conversations about what to show: CSCI only or both metrics. Raphael indicated that they have not received feedback on this issue from the Scientific Advisory Panel; however, the stakeholders were interested in evaluating both metrics. Ken indicated that the tools provide different types of information, so there is a reason to have both and provides another source of information to understand stream conditions.
- Ken indicated that if the State Board provides a specific threshold, then this will apply statewide. However, Regional Boards could interpret differently or site-specific threshold values could be developed. Ken has suggested that the State Board include language in their policy that encourages additional reference site data collection.
- Jon asked about the use of the MMI in low gradient streams (which was a criticism on use of SC-IBI). There are some papers available that discuss this and Raphael will send.
- For the SC-IBI map (Slide 15), Jon indicated that the scores decrease moving downstream, after a point of significant development (independent of the Monterey Formation).
- Explanatory variables were considered. Specifically, correlations were evaluated with PHAB to SC-IBI (Slide 16). Little correlation was found. In Slide 17 and 18, the correlation with O/E and MMI was weaker. Jon indicated that these are based on limited data. Slide 21 shows that there is a weak negative correlation to nitrate (~1mg/L threshold of total nitrate). Slide 22 shows that the MMI and SC-IBI are correlated to upstream imperviousness; O/E does not show as strong of a correlation. Ken asked whether CSCI were used in any of these correlations (to date they have not).
- Cindy talked about what should be presented. Ken suggested presenting the various pieces as well as a final set with CSCI. TMDL thresholds can then be based on just the CSCI.

C. Assessment of Condition in Malibu Creek Watershed

1. MMI scores are typically worse than O/E scores
2. Overall, scores are getting worse over time
3. How do CSCI scores compare to SC-IBI scores?
4. How do differences between O/E and MMI considered?
5. Due to different goals between the Statewide Bio-Objective development goals and the TMDL, how is the additional information useful? Or may need improvement?

Notes

- Cindy mentioned that the timing seemed to make a significant difference in the Malibu data. MMI is fairly consistent, while O/E varies more over time (no impairment before 2005). Raphael suggested looking at the taxa list and see what taxa(s) disappeared at this time. Andy indicated that at this time, the taxonomy analyses shifted and midges were only identified to family. This could explain the temporal change in results.
- Cindy asked whether there was anything else SCCWRP suggested we should look at:
 - Raphael suggested looking at the taxa list and whether that explains the change.
 - Ann indicated that the shift in taxonomic analysis (family only for midges) could likely explain this.
 - Also need to look at the issue regarding the change in "E" by site. Ann and Raphael will investigate this issue.

General Questions

1. Comments on Malibu Creek and bioassessment.
2. What is progress on the periphyton/algae biomass index?

Notes

- Ken encouraged Cindy to talk more with Karen to discuss linkage with the TMDL process on the implementation side. For the presentation of this information in the TMDL, Ken suggested additional discussion and presentation on the causal assessment (pointing to nutrients) based on his conversations with some stakeholders.
- Ken will send draft documentation for early preview before wider public distribution. This will help construct the TMDL language and ensure accurate interpretation of the results.
- Some draft documentation will be publicly available by the time the TMDL is finalized (late May).
- SCCWRP appreciate feedback on user's guide documentation in the future.